

WE CLAIM:

1. A storage control apparatus in a storage system comprising a first storage control apparatus for receiving a data input/output request from an information processing apparatus and performing a data input/output process relative to a first storage volume for storing data and a second storage control apparatus connected to said first storage control apparatus in a communication enable state for performing a data input/output process relative to a second storage volume for storing data,

    said first storage control apparatus comprises:

        a first memory for storing data transferred between said first storage control apparatus and said second storage control apparatus;

        a second memory;

        an input/output control unit for writing data transfer information in said second memory, said data transfer information containing a storage location of data in said first memory and a storage location of data in said second storage control apparatus; and

        a data transfer control unit having a data buffer for storing data and a data transfer register for storing said data transfer information, said data transfer control unit controlling data transfer between said first memory and said second storage control apparatus via said data buffer in accordance with said

data transfer information read from said second memory and written in said data transfer register,

wherein, when a second data transfer based on second data transfer information is controlled while a first data transfer based on first data transfer information is controlled, said data transfer control unit writes said first data transfer information stored in said data transfer register and data stored in said data buffer into said second memory, reads said second data transfer information from said second memory, writes said second data transfer information in said data transfer register, and in accordance with said second data transfer information, controls said second data transfer.

2. A storage control apparatus according to claim 1, wherein:

said data transfer control unit comprises a plurality of said data buffers and a plurality of said data transfer registers; and

when a second data transfer based on second data transfer information is controlled while a first data transfer based on first data transfer information is controlled, said data transfer control unit reads said second data transfer information from said second memory, writes said second data transfer information into a second data transfer register, and in accordance with the second data transfer information, controls said second data transfer before said first data

transfer information and data to be transmitted and received by said first data transfer are read from a first data transfer register storing said first data transfer information and a first data buffer storing the data to be transmitted and received by said first data transfer and written in said second memory.

3. A storage control apparatus according to claim 1, wherein said data transfer is controlled in a unit of each data block obtained by dividing data to be transferred between said first storage control apparatus and said second control apparatus into at least one or more data.

4. A storage control apparatus according to claim 1, wherein said first storage control apparatus is connected to said second storage control apparatus in a communication enable state via at least one or more switches.

5. A storage control apparatus according to claim 1, wherein:

when said data input/output request relative to said second storage volume is received from said information processing apparatus, said data transfer information is written in said second memory; and

    said data transfer control unit reads said data transfer information from said second memory, writes said data transfer information in said data transfer register, and in accordance with said read data transfer information, controls data transfer

between said first memory and said second storage control apparatus.

6. A storage control apparatus according to claim 1, wherein:

when a data write request relative to said first storage volume and write data are received from said information processing apparatus, said input/output control unit writes said data transfer information in said second memory in order to write a copy of said write data into said second storage volume; and

said data transfer control unit reads said data transfer information from said second memory, writes said data transfer information into said data transfer register, and in accordance with said read data transfer information, controls transmission of said write data from said first memory to said second storage control apparatus.

7. A storage control apparatus according to claim 1, further comprising:

a channel control unit having a circuit board formed with said second memory, said input/output control unit and said data transfer control unit;

a cache memory unit having a circuit board formed with said first memory; and

a disk control unit for reading/writing data relative to said first storage volume,

wherein:

said first memory stores data to be transmitted and received at least between said first storage control apparatus and said information processing apparatus or said second storage control apparatus;

    said input/output control unit writes data transfer information in said second memory, said data transfer information containing the storage location of data in said first memory and a storage location of data in said information processing apparatus or said second storage apparatus; and

    said data transfer control unit controls data transfer between said first memory and said information processing apparatus or said second storage control apparatus via said data buffer in accordance with said data transfer information read from said second memory and written in said data transfer register.

8.       A storage control apparatus for a storage system comprising a first storage control apparatus for receiving a data input/output request from an information processing apparatus and performing a data input/output process relative to a first storage volume for storing data and a second storage control apparatus connected to said first storage control apparatus in a communication enable state via at least one or more switches for performing a data input/output process relative to a second storage volume for storing data,  
    said first storage control apparatus

comprises:

a cache memory unit having a circuit board formed with a first memory for storing data transferred at least between said first storage apparatus and said information processing apparatus or said second storage control apparatus;

a second memory;

an input/output control unit for writing data transfer information in said second memory, said data transfer information containing a storage location of data in said first memory and a storage location of data in said information processing apparatus or said second storage control apparatus;

a channel control unit having a circuit board formed with a data transfer control unit, said data transfer control unit having a plurality of data buffers for storing data and a plurality of data transfer registers for storing said data transfer information, and controlling data transfer between said first memory and said information processing apparatus or said second storage control apparatus via said data buffer in accordance with said data transfer information read from said second memory and written in said data transfer register; and

a disk control unit for reading/writing data relative to said first storage volume,

wherein, when a second data transfer based on second data transfer information is controlled while a

first data transfer based on first data transfer information is controlled, said data transfer control unit reads said second data transfer information from said second memory, writes said second data transfer information into a second data transfer register, and in accordance with the second data transfer information, controls said second data transfer before said first data transfer information and data to be transmitted and received by said first data transfer are read from a first data transfer register storing said first data transfer information and a first data buffer storing the data to be transmitted and received by said first data transfer and written in said second memory.

9. A method of controlling a storage control apparatus in a storage system comprising a first storage control apparatus for receiving a data input/output request from an information processing apparatus and performing a data input/output process relative to a first storage volume for storing data and a second storage control apparatus connected to said first storage control apparatus in a communication enable state for performing a data input/output process relative to a second storage volume for storing data,  
said first storage control apparatus comprises:  
a first memory for storing data transferred between said first storage control apparatus and said

second storage control apparatus;  
a second memory;  
an input/output control unit for writing data transfer information in said second memory, said data transfer information containing a storage location of data in said first memory and a storage location of data in said second storage control apparatus; and  
a data transfer control unit having a data buffer for storing data and a data transfer register for storing said data transfer information, said data transfer control unit controlling data transfer between said first memory and said second storage control apparatus via said data buffer in accordance with said data transfer information read from said second memory and written in said data transfer register,

wherein, when a second data transfer based on second data transfer information is controlled while a first data transfer based on first data transfer information is controlled, said data transfer control unit writes said first data transfer information stored in said data transfer register and data stored in said data buffer into said second memory, reads said second data transfer information from said second memory, writes said second data transfer information in said data transfer register, and in accordance with said second data transfer information, controls said second data transfer.

10. A method of controlling a storage control

apparatus according to claim 9, wherein:

    said data transfer control unit comprises a plurality of said data buffers and a plurality of said data transfer registers; and

    when a second data transfer based on second data transfer information is controlled while a first data transfer based on first data transfer information is controlled, said data transfer control unit reads said second data transfer information from said second memory, writes said second data transfer information into a second data transfer register, and in accordance with the second data transfer information, controls said second data transfer before said first data transfer information and data to be transmitted and received by said first data transfer are read from a first data transfer register storing said first data transfer information and a first data buffer storing the data to be transmitted and received by said first data transfer and written in said second memory.

11.       A method of controlling a storage control apparatus according to claim 9, wherein said data transfer is controlled in a unit of each data block obtained by dividing data to be transferred between said first storage control apparatus and said second control apparatus into at least one or more data.

12.       A method of controlling a storage control apparatus according to claim 9, wherein said first storage control apparatus is connected to said second

storage control apparatus in a communication enable state via at least one or more switches.

13. A method of controlling a storage control apparatus according to claim 9, wherein:

when said data input/output request relative to said second storage volume is received from said information processing apparatus, said data transfer information is written in said second memory; and

    said data transfer control unit reads said data transfer information from said second memory, writes said data transfer information in said data transfer register, and in accordance with said read data transfer information, controls data transfer between said first memory and said second storage control apparatus.

14. A method of controlling a storage control apparatus according to claim 9, wherein:

    when a data write request relative to said first storage volume and write data are received from said information processing apparatus, said input/output control unit writes said data transfer information in said second memory in order to write a copy of said write data into said second storage volume; and

    said data transfer control unit reads said data transfer information from said second memory, writes said data transfer information into said data transfer register, and in accordance with said read

data transfer information, controls transmission of said write data from said first memory to said second storage control apparatus.

15. A method of controlling a storage control apparatus according to claim 9, further comprising:

    a channel control unit having a circuit board formed with said second memory, said input/output control unit and said data transfer control unit;

    a cache memory unit having a circuit board formed with said first memory; and

    a disk control unit for reading/writing data relative to said first storage volume,

    wherein:

        said first memory stores data to be transmitted and received at least between said first storage control apparatus and said information processing apparatus or said second storage control apparatus;

        said input/output control unit writes data transfer information in said second memory, said data transfer information containing the storage location of data in said first memory and a storage location of data in said information processing apparatus or said second storage apparatus; and

        said data transfer control unit controls data transfer between said first memory and said information processing apparatus or said second storage control apparatus via said data buffer in accordance with said

data transfer information read from said second memory  
and written in said data transfer register.